

# IDS Data Flow Coordination (2006-2008)

## Introduction

Two data centers currently support the archiving and access activities for the IDS:

- Crustal Dynamics Data Information System (CDDIS), NASA GSFC, Greenbelt, MD USA
- Institut Géographique National (IGN), Saint Mandé France

These institutions have archived DORIS data since the launch of TOPEX/Poseidon in 1992.

## Flow of IDS Data and Products

The flow of data, products, and information within the IDS is analogous to what is utilized in the other IAG geometric services (IGS, ILRS, IVS) and is shown in Figure 1. IDS data and products are transmitted from their source to the IDS data centers. DORIS data are downloaded from the satellite at the DORIS control and processing center, SSALTO (Segment Sol multi-missions d'ALTimétrie, d'Orbitographie et de localisation précise) in Toulouse, France. After validation, SSALTO transmits the data to the IDS data centers. IDS analysis centers, as well as other users, retrieve these data files from the data centers and produce products, which in turn are transmitted to the IDS data centers.

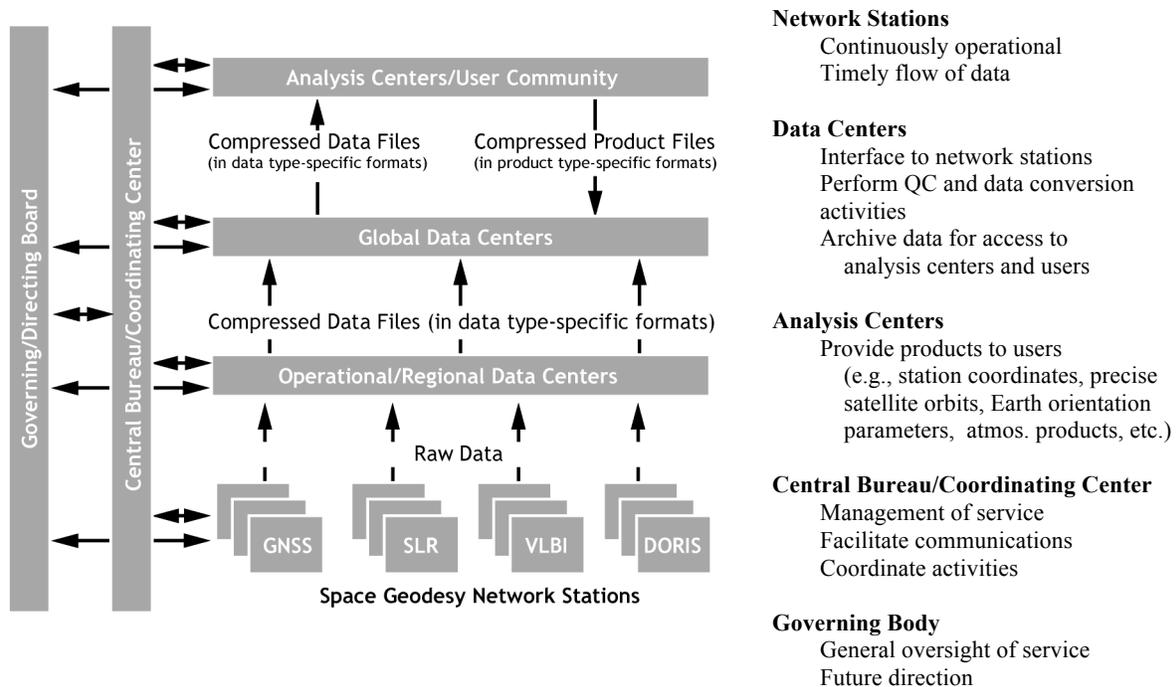


Figure 1. Routine flow of data and information for the IAG Geodetic Services

The IDS data centers use a common structure for directories and filenames that was implemented in January 2003. This structure is shown in Table 1 and fully described on the IDS Central

Bureau website at [http://ids.cls.fr/html/analysis\\_coord/documents/struct\\_dc.html](http://ids.cls.fr/html/analysis_coord/documents/struct_dc.html). The main directories are:

- */pub/doris/data* (for all data) with subdirectories by satellite code
- */pub/doris/products* (for all products) with subdirectories by product type and analysis center
- */pub/doris/cb\_mirror* with general information and data and product documentation (maintained by the IDS Central Bureau)

SSALTO and the analysis centers deliver data and products to both IDS data centers (CDDIS and IGN) to ensure redundancy in data delivery in the event one data center is unavailable. The general information available through the IDS Central Bureau ftp site are mirrored by the IDS data centers thus providing users secondary locations for these files as well

Table 1. Main Directories for IDS Data and Products

Directory	File Name	Description
<b>Data Directories</b>		
<i>/doris/data/sss</i>	<i>ssldataMMM.LLL.Z</i> <i>sss.files</i>	DORIS data for satellite <i>sss</i> , cycle number <i>MMM</i> , and version <i>LLL</i> File containing multi-day cycle filenames versus time span for satellite <i>sss</i>
<i>/doris/data/sss/sum</i>	<i>ssldataMMM.LLL.sum.Z</i>	Summary of contents of DORIS data file for satellite <i>sss</i> , cycle number <i>MMM</i> , and file version number <i>LLL</i>
<i>/doris/data/sss/yyyy</i>	<i>sssrxyYDDD.LLL.Z</i>	DORIS data (RINEX format) for satellite <i>sss</i> , date <i>YYDDD</i> , version number <i>LLL</i>
<i>/doris/data/sss/yyyy/sum</i>	<i>sssrxyYDDD.LLL.sum.Z</i>	Summary of contents of DORIS data file for satellite <i>sss</i> , cycle number <i>MMM</i> , and file version number <i>LLL</i>
<b>Product Directories</b>		
<i>/doris/orbits/</i>	<i>ccc/ccsssVV.bXXDDD.eYEEEE.sp1.LLL.Z</i>	Satellite orbits in SP1 format from analysis center <i>ccc</i> , satellite <i>sss</i> , solution version <i>VV</i> , start date year <i>XX</i> and day <i>DDD</i> , end date year <i>YY</i> and day <i>EEE</i> , and file version number <i>LLL</i>
<i>/doris/sinex_global/</i>	<i>cccWWuVV.snz.Z</i>	Global SINEX solutions of station coordinates for analysis center <i>ccc</i> , year <i>WW</i> , content <i>u</i> (d=DORIS, c=multi-technique), and solution version <i>VV</i>
<i>/doris/sinex_series/</i>	<i>ccc/ccsYYDDDtVV.snz.Z</i>	Time series SINEX solutions for analysis center <i>ccc</i> , starting on year <i>YY</i> and day of year <i>DDD</i> , type <i>t</i> (m=monthly, w=weekly, d=daily) solution, content <i>u</i> (d=DORIS, c=multi-technique), and solution version <i>VV</i>
<i>/doris/stcd/</i>	<i>cccWWtu/ccsWWtuVV.stcd.aaaa.Z</i>	Station coordinate time series SINEX solutions for analysis center <i>ccc</i> , for year <i>WW</i> , type <i>t</i> (m=monthly, w=weekly, d=daily), content <i>u</i> (d=DORIS, c=multi-technique), solution version <i>VV</i> , for station <i>aaaa</i>
<i>/doris/geoc/</i>	<i>cccWWtuVV.geoc.Z</i>	TRF origin (geocenter) solutions for analysis center <i>ccc</i> , for year <i>WW</i> , type <i>t</i> (m=monthly, w=weekly, d=daily), content <i>u</i> (d=DORIS, c=multi-technique), and solution version <i>VV</i>
<i>/doris/eop/</i>	<i>cccWWtuVV.eop.Z</i>	Earth orientation parameter solutions for analysis center <i>ccc</i> , for year <i>WW</i> , type <i>t</i> (m=monthly, w=weekly, d=daily), content <i>u</i> (d=DORIS, c=multi-technique), and solution version <i>VV</i>
<i>/doris/iono/</i>	<i>sss/ccsssVV.YYDDD.iono.Z</i>	Ionosphere products for analysis center <i>ccc</i> , satellite <i>sss</i> , solution version <i>VV</i> , and starting on year <i>YY</i> and day of year <i>DDD</i> .
<b>Information Directories</b>		
<i>/doris/cb_mirror</i>		Mirror of IDS central bureau files

## DORIS Data

SSALTO deposits DORIS data to the CDDIS and IGN servers. Software at the data centers scans these incoming data areas for new files and automatically archives the files to public disk areas using the directory structure and filenames specified by the IDS. The IDS data centers archive DORIS data from six operational satellites (SPOT-2, -4, -5, Jason-1, -2, and Envisat); data from future missions (e.g., CryoSat-2, SARAL, etc.) will be archived within the IDS. Historic data from SPOT-3 and TOPEX/Poseidon are also available at the data centers. A summary of DORIS data holdings at the IDS data centers is shown in Table 2. The DORIS data from all satellites are archived in multi-day (satellite dependent) “cycle” files using the DORIS data format 2.1 (since January 15, 2002). The DORIS data files are on average two Mbytes in size (using UNIX compression). SSALTO issues an email notification through DORISReport once data are delivered to the IDS data centers. The number of days per file and average latency of data availability after the last observation day satellite specific are shown in Table 3. The delay in data delivery to the data centers (in days by satellite) is shown in Figure 2.

Table 2. DORIS Data Holdings

<b>Satellite</b>	<b>Time Span</b>
TOPEX/Poseidon	25-Sep-1992 through 01-Nov-2004
SPOT-2	31-Mar through 04-Jul-1990
	04-Nov-1992 through present
SPOT-3	01-Feb-1994 through 09-Nov-1996
SPOT-4	01-May-1998 through present
SPOT-5	11-Jun-2002 through present
Jason-1	15-Jan-2002 through present
Jason-2	12-Jul-2008 through present
Envisat	13-Jun-2002 through present

Table 3. DORIS Data File Information

<b>Satellite</b>	<b>Number of Days/ Cycle File</b>	<b>Average Latency (Days)</b>
Envisat	6	22
Jason-1	10	18
Jason-2	10	42*
SPOT-2, -4, -5	9	24

\*Note: Jason-2 data started mid-2008; latency improved following initial deliveries

DORIS data from Jason-2, launched in June 2008, are also available in RINEX (Receiver Independent Exchange Format), version 3.0. The Jason-2 satellite houses the newer, next generation DORIS instrumentation capable of generating these data in RINEX format; future satellites will also utilize this type of DORIS receiver. These data are forwarded to the IDS data centers in daily files prior to orbit processing within one day (typically) following the end of the observation day.

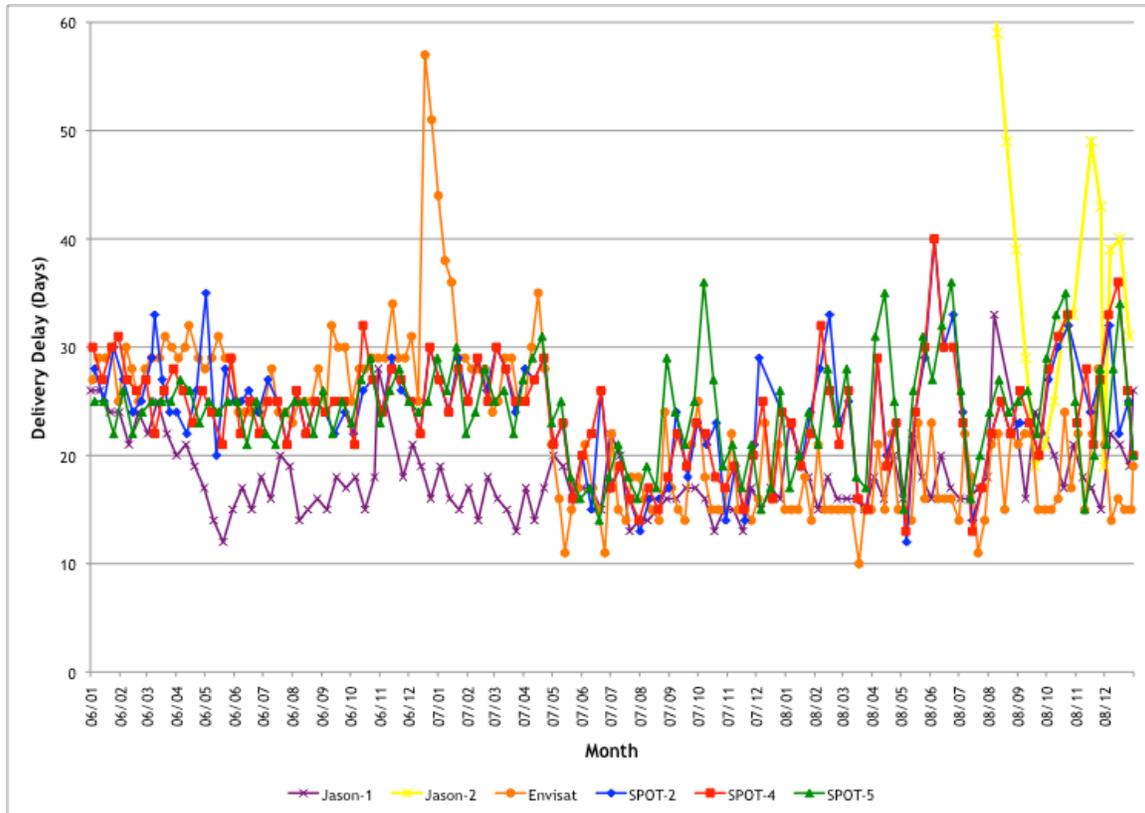


Figure 2. Delay in delivery of DORIS data to the CDDIS (all satellites, 01/2005-12/2008)

## DORIS Products

IDS analysis centers utilize similar procedures by putting products to the CDDIS and IGN servers. Automated software detects any incoming product files and archives them to the appropriate product-specific directory. The following analysis centers (ACs) have submitted products on an operational basis to the IDS; their AC code is listed in ( ):

- NASA Goddard Space Flight Center (gsc) USA, F. Lemoine
- Institut Géographique National/JPL (ign) France, P. Willis
- LEGOS/GRGS-CLS (lca) France, J.-F. Crétaux
- SSALTO (ssa) France, G. Tavernier
- CNES/SOD (sod) France, J.P. Berthias
- INASAN (ina) Russia, S. Kuzin

IDS products are archived by type of solution and analysis center. The types and sources of products available through the IDS data centers in 2005-2008 are shown in Table 4. This table also includes a list of products under evaluation from several proposed DORIS analysis centers.

## Future Plans

The IDS data centers will investigate procedures to regularly compare holdings of data and products to ensure that the archives are truly identical.

Table 4. IDS Product Types and Contributing Analysis Centers

<b>Type of Product</b>	<b>Operational ACs/Products</b>					
	<b>GSC</b>	<b>IGN</b>	<b>INA</b>	<b>LCA</b>	<b>SSA</b>	<b>SOD</b>
Time series of SINEX solutions	X (W)	X (W,M)	X (W,M)	X (W,M)	X (W,M)	X (W)
Global SINEX solutions		X		X		
Time series of coordinates of the TRF origin		X	X	X		
Orbits/satellite	X (5)			X (5)		
Ionosphere products/satellite					X (6)	
Time series of EOP		X	X			
Time series of station coordinate		X (W)	X (W)	X (W,M)	X (W)	
<b>Type of Product</b>	<b>Proposed ACs/Products</b>					
	<b>GA</b>	<b>GOP</b>	<b>GRG</b>	<b>IGN</b>	<b>INA</b>	
Time series of SINEX solutions	X (W)	X (W)				
Orbits/satellite			X	X (7)	X (7)	

Notes: W=weekly solution  
M=monthly solution

## **IDS Data Centers (2006-2008)**

### **Crustal Dynamics Data Information System (CDDIS)**

The CDDIS is a dedicated data center supporting the international space geodesy community since 1982. The CDDIS serves as one of the primary data centers for the following IAG services:

- International GNSS Service (IGS)
- International Laser Ranging Service (ILRS)
- International VLBI Service for Geodesy and Astrometry (IVS)
- International DORIS Service (IDS)
- International Earth Rotation Service (IERS)

The CDDIS automated software archives data submitted by SSALTO and performs minimal quality-checks (e.g., file readability, format compliance) resulting in a summary file for each data file. Software extracts metadata from all incoming DORIS data. These metadata include satellite, time span, station, and number of observations per pass. The metadata are loaded into a database and utilized to generate data holding reports on a daily basis. Approximately 20Gbytes of CDDIS disk space is devoted to the archive of DORIS data, products, and information.

During 2008, over 350 international groups downloaded over 100 Gbytes of DORIS data and information from the CDDIS.

#### **Future Plans**

The CDDIS plans to be operational in a new distributed server environment by spring 2009. The structure of the DORIS data and product archive will remain unchanged in this new system configuration.

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